What is claimed is:

1. A semiconductor device inspection apparatus for acquiring electric contact between a semiconductor device and an inspection substrate, comprising:

a wafer stage on which said semiconductor device as an inspection target is to be placed;

a base table;

an X stage mounted on said base table and movable in an X direction;

a Y stage mounted on said X stage and movable in a Y direction crossing said X direction;

an elevation unit which is mounted on said Y stage and elevates said wafer stage up and down;

a rotary unit which turns said wafer stage;

a vibration elimination table which reduces vibration of said base table;

a probe card having a plurality of probe needles which electrically contact a plurality of electrodes when said wafer stage moves upward;

a probe card holder in which said probe card is to be placed;

a sensor which detects heights of said probe needles of said probe card;

a camera which picks up images of said inspection target and said probe needles of said probe card;

image processing means which performs image processing on said images picked up by said camera; and

a control section which computes positions of said inspection target and said probe card based on image information acquired by said image processing means and controls said X stage, said Y stage and said rotary unit based on results of that computation.

2. The semiconductor device inspection apparatus according to claim 1, wherein a linear scale for detecting X-directional and Y-directional positions is arranged at center portions of said X stage and said Y stage, centers of said X stage and said Y stage are aligned with a center of an inspection probe and drive motors for said X stage and said Y stage and guide rails for guiding said X stage and said Y stage in said X direction and Y direction are laid out symmetrically with respect to said center of said inspection probe.

3. The semiconductor device inspection apparatus according to claim 2, wherein a linear scale for detecting up and down positions of said wafer stage is provided on said elevation unit for said wafer stage,

said elevation unit has a fixed frame which is driven up and down by a stepping motor, a movable frame, crossroller guides which guide said movable frame in such a manner as to be movable up and down with respect to said fixed frame, a cylinder which is fixed to said fixed frame and whose piston rod pushes said movable frame upward, a load sensor which detects a load applied by a contact bar fixed to said movable frame as said contact bar abuts on

said load sensor when said movable frame moves upward, and a control section which controls pressing force by said cylinder based on said load detected by said load sensor, and

said load sensor restricts upward movement of said contact bar, not downward movement of said contact bar, when said contact bar abuts on said load sensor.

4. The semiconductor device inspection apparatus according to claim 1, wherein said camera and said probe card holder are mounted on bridge leg portions mounted on said base table and said base table and said bridge leg portions are made of a natural stone or material with low thermal expansion and a high vibration attenuating property which is comparable to said natural stone.

5. The semiconductor device inspection apparatus according to claim 1, wherein a camera mounted on a stable movable in X, Y and Z directions is placed on a top surface of said probe card holder so as to be able to observe a state of contact between said electrodes of said inspection target and said probe needles of said probe card.

6. The semiconductor device inspection apparatus according to claim 1, wherein a valve is provided on a side surface of said wafer stage and an inspection target varying in size from an individual semiconductor device to a wafer size of a large diameter can be mounted and inspected as a chuck area of said wafer stage is changed by switching said valve.

7. The semiconductor device inspection apparatus according to claim 1, wherein said camera as image processing means which picks up images of said inspection target and said probe needles of said probe card does not have an elevation unit and is fixed.

8. The semiconductor device inspection apparatus according to claim 1, wherein said probe card has a base material whose thermal expansion coefficient is substantially equal to a thermal expansion coefficient of said inspection target, and a heating source and a cooling jacket are buried in a lower portion of said wafer stage so that said inspection target can be inspected at a high temperature and temperature control can be performed.

9. The semiconductor device inspection apparatus according to claim 1, wherein in case where said electrodes of said inspection target are electrodes fabricated in an ordinary semiconductor device fabrication process and further having metal projections formed thereon, images of said metal projections are picked up after picking up images at positions of said electrodes fabricated in said semiconductor device fabrication process, image pickup of said probe needles and said inspection target is carried out at four locations.

10. A method of inspecting a semiconductor device by acquiring electric contact between a semiconductor device and an inspection substrate using an inspection apparatus comprising a wafer stage on which said semiconductor device

as an inspection target is to be placed, a base table, an X stage mounted on said base table and movable in an X direction, a Y stage mounted on said X stage and movable in a Y direction crossing said X direction, an elevation unit which is mounted on said Y stage and elevates said wafer stage up and down, a rotary unit which turns said wafer stage, a vibration elimination table which reduces vibration of said base table, a probe card having a plurality of probe needles which electrically contact a plurality of electrodes when said wafer stage moves upward, a probe card holder in which said probe card is to be placed, a sensor which detects heights of said probe needles of said probe card, a camera which picks up images of said inspection target and said probe needles of said probe card, image processing means which performs image processing on said images picked up by said camera, and a control section which computes positions of said inspection target and said probe card based on image information acquired by said image processing means and controls said X stage, said Y stage and said rotary unit based on results of that computation, said method comprising the steps of:

placing said inspection target on said wafer stage;

placing said probe card in said probe card holder;

picking up images of said inspection target and said probe needles of said probe card by said camera, computing positions of said images and then moving said X stage, said Y stage and a θ stage in such a way that positions of said

electrodes of said inspection target are aligned with positions of said probe needles, moving said elevation unit up to a position where said probe needles come in contact with said inspection target and then moving said elevation unit by a predetermined amount from that position of contact;

energizing said inspection target in that state and inspecting said inspection target;

moving said elevation unit down to a focal position of said camera for picking up said image of said inspection target;

moving said X stage and said Y stage to a position of a next inspection target from that moved-down position; and

repeating all the steps up to said step of moving said elevation unit down until inspection of all inspection targets is finished.

11. The method according to claim 10, wherein in said step of computing said positions of said images of said inspection target and said probe needles of said probe card by processing said images thereof, said X stage and said Y stage are moved in such a way that said electrodes of said inspection target and said probe needles of said probe card are positioned at a center position of said camera and said positions of said images of said inspection target and said probe needles of said probe card are computed by a linear scale.

12. The method according to claim 10, further

comprising the steps of:

checking electric contact between said probe needles and said inspection target while moving said elevation unit a little after said elevation unit is moved upward to a position where said probe needles come in contact with said inspection target;

detecting a point at which electric contact between said probe needles and said inspection target disappears;

measuring a lift-up amount of said elevation unit and a load and a relationship between said lift-up amount and a contactability while moving said elevation unit up a little with said point taken as a reference;

determining a stable contact area while changing a speed and an acceleration of said elevation unit in that measuring step; and

registering a probing profile which provides contact stability.

13. The method according to claim 10, wherein said contact detecting step includes the step of resetting load detecting means to zero when said elevation unit is moved up to a position apart from said probe needles by a predetermined distance, and the step of moving said elevation unit upward at a constant speed until a point of contact from a point at which said load detecting means has been resent to zero.